UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,616	10/13/2000	Tuqiang Ni	2328-049	8431

12

7590 05/23/2003

LOWE HAUPTMAN GOPSTEIN GILMAN & BERNER, LLP
Suite 310
1700 Diagonal Road
Alexandria, VA 22314

EXAMINER	
ALEJANDRO MULERO, LUZ L	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 05/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/689,616	NI ET AL.
	Examiner	Art Unit
	Luz L. Alejandro	1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32 and 40-44* is/are pending in the application.

4a) Of the above claim(s) *19-21* is/are withdrawn from consideration.

5)☒ Claim(s) *25-32* is/are allowed.

6)☒ Claim(s) *1-6,15-18 and 22-24* is/are rejected.

7)☒ Claim(s) *7-14,40-44* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4)☐ Interview Summary (PTO-413) Paper No(s). _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6, 17-18, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldwin et al., WO 99/34399 in view of Collins et al., U.S. Patent 6,077,384 and Ishii et al., U.S. Patent 5,795,429.

Baldwin et al. shows the invention substantially as claimed including a vacuum plasma processor 10 for processing workpieces comprising a vacuum chamber 12 having an inlet 32 for supplying gas to the chamber; an electrode arrangement 56 for ionizing gas in the chamber into a plasma, a coil 36 outside the chamber for generating

an electromagnetic field for ionizing gas in the chamber to a plasma, a non-magnetic metal arrangement 44 interposed between the coil 36 and the electrode 56; the coil 36, non-magnetic metal arrangement 44 and electrode 56 being positioned and arranged for preventing substantial electric field components of the electromagnetic field from being incident on the electrode while enabling substantial electric and magnetic field components from the coil 36 to be incident on the gas for ionizing the gas (see fig. 1 and page 12-line 25 to page 22-line 14). Baldwin et al. also discloses that any suitable configuration which allows electromagnetic fields to pass from the coil to the gas in the chamber to energize the gas into a plasma is suitable (see page 17, lines 17-20).

Baldwin et al. fails to expressly disclose: a) that the electrode can be a semiconductor material, b) the conductivity of the semiconductor being greater than 0.1ohm/cm, and c) the coil, non-magnetic metal member, and semiconductor member being positioned and arranged for preventing substantial electromagnetic field components of the electromagnetic field from being incident on the semiconductor member while enabling substantial electric and magnetic field components from the coil to be incident on the gas for ionizing the gas. Collins et al. discloses a similar apparatus in which a ceiling electrode 110 is comprised of silicon, a semiconductor (see fig. 1, and col. 15-line 40 to col. 19-line 15). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Baldwin et al. so as to include the semiconductor electrode of Collins et al. because such material is suitable for constructing the electrode and because it provides low impedance to the RF induction field. Regarding the concentration of dopants in the

electrode, it would have been obvious to one of ordinary skill in the art to make the electrode as conductive as possible in order to provide for a more energized plasma.

Furthermore, Ishii et al. discloses forming a non-magnetic metal arrangement 30 so that substantial electric and magnetic field components are enabled into the plasma at the outer peripheral portions of the coil 24 and substantial electric field components are prevented from being incident upon the top central portion of the chamber by the presence of the non-magnetic metal arrangement (see fig. 2 and col. 5-line 35 to col. 8-line 65). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the primary reference of Baldwin et al. so as to include the non-magnetic metal arrangement of Ishii et al. because blocking substantial electric field components in the top central region of the processing chamber as disclosed by Ishii et al. allows for a more uniform plasma density on the workpiece.

With respect to claims 2-3, note in Baldwin et al. that the chamber includes a dielectric window 18 which is interposed between the electrode 56 in the chamber and coil 36, and allows for coupling the electromagnetic field into the chamber (see fig. 1).

Concerning claim 5, note in Baldwin et al. that the non-magnetic metal arrangement 44 is spaced from the electrode 56.

With respect to the non-magnetic metal member abutting the semiconductor member (claims 4 and 6), such arrangement is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that such particular arrangement is significant, since there is no evidence that such arrangement would significantly affect the overall performance of the plasma processing apparatus.

Furthermore, rearrangement of parts has been held to have been obvious, and therefore a prima facie case of obviousness exists.

Concerning claim 17, note that Baldwin includes a workpiece holder 20 in the chamber, and a source 22 for applying RF bias to the workpiece 11 via the workpiece holder 20.

With respect to claim 18, a power supply arrangement 40 is included for supplying RF ion energization to the coil and an RF bias source 22 for supplying RF energization to the workpiece and for supplying voltages to the electrode (see RF source 57 in fig. 1) and the non-magnetic metal arrangement (see DC or RF source 48 in fig. 1).

Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldwin et al., WO 99/34399 in view of Collins et al., U.S. Patent 6,077,384 and Ishii et al., U.S. Patent 5,795,429 as applied to claims 1-6, 17-18, and 22-24 above, and further in view of Koshimizu, U.S. Patent 6,101,970.

Baldwin et al., Collins et al., and Ishii et al. are applied as above but fail to expressly disclose a drive for varying the distance between the workpiece bearing surface and the coil. Koshimizu discloses a drive 122 for varying the distance between the workpiece bearing surface 116 and the coil 110 (see fig. 1 and col. 3-line 51 to col. 4-line 17). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Baldwin et al. modified by Collins et al. and Ishii et al., to include a drive for varying the distance

between the workpiece bearing surface and the coil as disclosed by Koshimizu because this would allow for varying the plasma concentration which the workpiece is subjected to, thus optimizing the apparatus.

Response to Arguments

Applicant's arguments filed 3/18/03 have been fully considered but they are not persuasive. Applicant argues that Collins et al. is not combinable with the Baldwin et al. and Ishii et al. references because Collins et al. requires a semiconductor window of high resistivity. However, the examiner respectfully disagrees with this assertion by applicant, because in one potential embodiment a semiconductor material with a resistivity of 0.01 Ω-cm can be used when the thickness of the semiconductor window is reduced (see col. 19-lines 51-56). Furthermore, utilizing this alternative semiconductor material which is drastically more conductive than the high resistivity window discussed by applicant would provide one of ordinary skill in the art with a reasonable expectation of success when combining the references, as required to establish a prima facie case of obviousness.

Concerning applicant's statements regarding claim 4, applicant is reminded that the arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965).

With respect to claim 6, note that the delineation between what constitutes a first member and a second member is completely arbitrary and therefore such limitation as broadly interpreted reads on the non-magnetic metal arrangement 44 of Baldwin et al.,

since there are no distinguishing claimed characteristics between the first and the second members. For example, if the non-magnetic metal arrangement 44 was divided in half, there will be a first member and a second member as claimed.

Allowable Subject Matter

Claims 25-32 are allowed.

Claims 7-14 and 40-44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Luz L. Alejandro
Patent Examiner
Art Unit 1763

May 22, 2003